S.A.E AFIKIM
COMPUTERIZED DAIRY MANAGEMENT SYSTEM

Afi-lite Plus™
Milk Meter

(Product number 4098999)

User Manual

Table of Contents

Updates
to the *Afi-lite Plus* user manual

Through out this manual, the term *Afilite* milk meter refers to the *Af-lite Plus* milk meter.

This table is a list of updates inserted into this manual.

Page		Subject of update	Date of update
5	(one sheet)	The appearance of the 7 segment display, when starting up, has been corrected.	June 17, 2003
6		Stimulation activation instructions are added.	July 27, 2003
9	(one sheet)	When assigned to an animal, *ALL* milking codes (1-8) deactivate the key.	May 20, 2003
10			
11		Table depicting how codes are displayed is updated.	May 20, 2003
15	(one sheet)	When entering milk meter ID number, press [↗] and [0] (not 6 key).	June 19, 2003
16		The Milk Flow Rate formula has been updated.	July 27, 2003
30		Error message **E05** is added to troubleshooting.	June 17, 2003

Chapter 1: Overview

The *Afi-lite* milk meter is installed at every milking point and performs the following tasks during milking:

- Measures the amount of milk produced.

- Measures conductivity of the milk.

- Controls Automatic Cluster Removal (ACR).

- Displays cow information.

- Alerts milkers to health and milking irregularities.

The S.A.E. Afikim *Afi-lite* milk meter is made up of two units:

- The *Afi-lite* control box.
- The *Afi flo* milk meter body.

Chapter 2: The Milk Meter Control Box

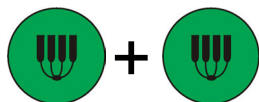This chapter describes operation of the *Afi-lite* milk meter control box.

The Afi-lite *milk meter control box*

Key functions

The keys, and their functions, are described below. At the press of each key side lights glow on the sides of the control box, to verify contact.

The Start key: Press this key to start milking.

Press the start key twice rapidly when:

- The cow at the milking point is not identified. After manually entering the cow number, press twice rapidly to start milking.

- A milking code has deactivated the start key. The cow may need special attention if this occurs (page 9). After the making the necessary preparations, press twice rapidly to start milking.

The Stop key: Pressing this key manually stops milking and activates cluster removal.
After the cluster removal process is finished, pressing this key lowers the cluster. Pressing it again returns the cluster to the upper position. This is helpful when adjusting cluster tubes. This also enables you to attach the cluster to the jetter while other cows are still being milked.

The Cancel ACR key: *Afi-lite* will detach the cluster automatically, when the milk flow rate drops to a predefined level. Manual detachment is performed to override this mechanism. Pressing this key cancels the automatic cluster removal.
The red LED in this key is illuminated when the Automatic Cluster Removal is cancelled.

If the *Cancel ACR* is activated, the milker *must* press the stop key (   ) to manually remove the cluster, when the   cow has finished milking.
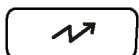
The Cleaning Mode key:

The red LED in this key is illuminated when the milk meter is in Cleaning Mode.
Press this key to toggle between milking mode and cleaning mode.

The Cow Identification key: Press this key to see the number of the cow identified at the milking point.

The Conductivity key: Press this key to display the milk conductivity of the cow at the milking point. The milk conductivity of mastitic cows is usually higher than normal. If a milk alert is displayed, compare the conductivity to the *expected* conductivity, as described on page 7.

Operating the *Afi-lite* Milk Meter

This section contains instructions on the milking process and on displaying cow information.

Milking with *Afi-lite* Milk Meters

1. Turn on the milk meters. *00.0ii* appears. (*ii* indicates pulsation.) Then for several seconds the identification number of each milking point appears:

    (for example *Id05*), followed by *-0- -0-*.

    The LED in the cleaning mode key glows, indicating that the milk meter is in cleaning mode.

    In stand-alone systems after the identification appears, *00.0ii* is displayed.

2. Press the key of each *Afi-lite* milk meter. This cancels the cleaning mode and the milk meter enters into milking mode.

3. Press the key of each milk meter. This shuts off the vacuum and retracts the cluster.

4. Bring the cows into the milking parlor. As each cow is identified at her milking point, her cow number is displayed on the control panel

    (for example *1308*).

    *   If the cow at a station is *not* identified, *-0- -0-* continues

        to flash. (In a stand-alone system *00.0ii* continues to be displayed.)

        If a cow number is not displayed, type the number of the cow and

        then press .

    *   If the cow has been assigned a code, such as *8* ("colostrum cow"), the

        code will flash *-8- -8-* alternately with the cow number *1308*.

    More information on codes and messages is in the following section.

5. To start milking, press the key. This starts the vacuum and releases the cluster.
If a code is assigned to the cow:

    a. Make the necessary preparations as required by the code.

    b. Press **+** (twice rapidly) to start milking.

Stimulation   The default setting is without stimulation pulsation:

- To activate pulsation, press **+**

  (twice rapidly) to start milking with stimulation.

- If a code is assigned to the cow, *and* if you want to activate stimulation:

      a. Make the necessary preparations as required by the code.

      b. Press **+** **+** (three times rapidly)

  to start milking with stimulation.

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6. Attach the cluster.

   (Very slow cows are milked with ACR deactivated. To deactivate the ACR press the ACR Cancel key ( ).

   The red LED glows, indicating that ACR is deactivated. When

   the cow has finished milking, press the key to shut off the vacuum and retract the cluster.)

WARNINGS:

1. Automatic cluster removal does not take place in this mode. Therefore, preventing over-milking—that is, manually stopping the milking—is the full responsibility of the milker.

2. The *Afi-lite* milk meter does not automatically reset to ACR mode. To restore ACR for the next cow, press the Cancel ACR key. The red LED in the key turns off, indicating that ACR is activated.

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7. Repeat steps 5 and 6 for each cow.

While milking is in process, the milk yield appears in the display. In addition, the milker can view the conductivity and additional cow information, as described in the following section.

8. Cluster removal occurs when the milk flow rate drops below a predefined level. The ACR function shuts off the vacuum and retracts the cluster.

9. When all of the cows in the row are finished milking, release the cows and repeat the process starting from step 4. The display is reset

   when is pressed.

Cow and Milk Information Accessible from *Afi-lite*

Important information on each cow and her milk can be read from the *Afi-lite* milk meter, where the cow is identified.

Identification Information

Cow Number: Press [🐄] to see the number of the cow identified at the milking point.

Cow number displays with communication protocol C2000 (default protocol):

If a cow number has more than four digits (ex. 12,345), the last four digits are displayed, and a point appears after the first digit displayed to indicate there are more digits in the cow number. For example: *2.345* . Press and hold [🐄] to see the first digits of the number. If the first digit is a letter, a "−" indicates a letter. For example: cow number A123 is displayed as *− 123* .

Group Number: Press [↗] and [2] simultaneously to see the group number of the cow identified at the milking point.

Milking Point (Stall) Number: Press [🐄] and [0] simultaneously to see milking point number of the *Afi-lite* milk meter.

Milking Information

Expected Yield: Press [↗] and [5] simultaneously to see the expected milk yield of the cow at the milking point.

Conductivity: Press [↗] to see the milk conductivity of the cow being milked.

Expected Conductivity: An increase in milk conductivity indicates possible mastitis. The *Afi-lite* milk meter automatically measures the milk's electrical conductivity. Conductivity level may be read either during or after milking.

Press [↗] and [1] simultaneously to see the *expected* milk conductivity of the cow.

Milk Flow Rate (momentary): Press [↗] and [6] to see the milk flow rate of the present milking, in units (kilograms or pounds) per minute.

Milk Flow Rate (average):   Press [↗] and [8] to see the average milk flow rate of the cow being milked.

Milking Time ("claw on" time): Press [↗] and [7] to see the milking time of the cow at the milking point.

Calender Information

Days after Heat: Press [🐄] and [1] simultaneously to see the number of days that have passed since the cows last heat cycle.

Days in Milk (DIM):   Press [🐄] and [2] simultaneously to see the number of days that have passed since the cow calved.

Days after Insemination: Press [🐄] and [3] simultaneously to see the number of days that have passed since the cow was last inseminated.

Calving Date: Press [🐄] and [4] simultaneously to see the date when the cow calved. The numbers displayed are the day and month, as defined in *AfiFarm* (day day month month, *or* month month day day)

Insemination Date: Press [🐄] and [5] simultaneously to see the date when the cow was last inseminated. The numbers displayed are the day and month, as defined in *AfiFarm* (day day month month, *or* month month day day)

Messages, Milking Codes and Alerts

Milking codes, and messages are a means of communication between milkers and the computer.

Messages are sent by milkers *from* a milk meter *to* the computer. Messages are explained on page 12.
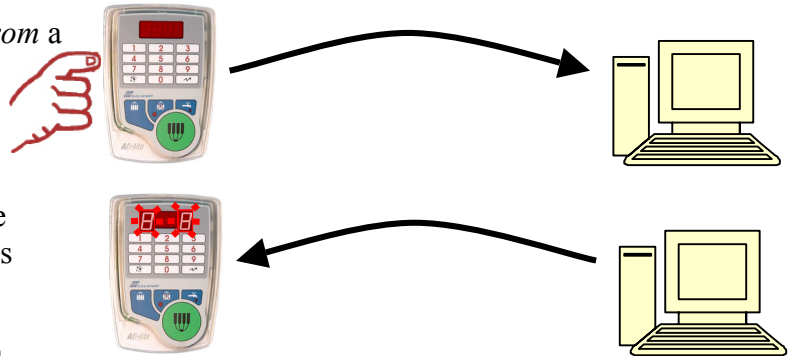
Milking codes are sent *from* the computer *to* a milk meter. Codes warn milkers of cows that need special attention. Milking codes are explained below.

Alerts are calculated from real-time data. Alerts are explained on the following page.

Milking Codes

Numbers 1 through 8 are used by the computer as code numbers to alert milkers to situations where special attention is needed. (For example: a cow with colostrum is assigned code 8 "colostrum cow.") If the cow identified is assigned a code, the code number is displayed before milking. Some codes display additional alerts.

When the cow identified is assigned a code, the key is temporarily deactivated. After making the necessary preparations, milking is started by pressing twice rapidly. When triggered, the code number flashes alternately with the cow number. For example, if cow 1305 has just calved:

The cow number flashes alternately with code *8* indicating a "colostrum cow."

> Milkers must know the meaning of each milking code, and action to be taken, when a code is flashing.
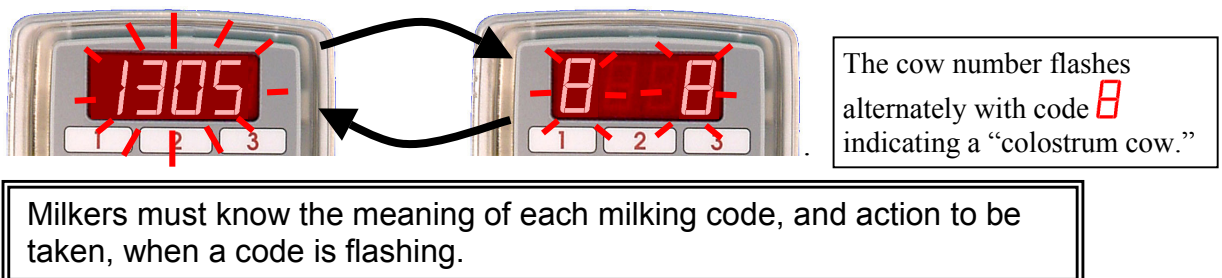
Codes 1 through 8 can be assigned to (and canceled from) cows from *Afi-lite* milk meters, in the parlor. (Assigning codes is explained in the following section on messages).

For example, if the cow presently at the milking point is number 1322, and you have just given her antibiotics, you can assign a code to designate her treatment. Code 7 can be used to designate a cow treated with antibiotics. From the *Afi-lite* milk meter, you can send a message to enter code 7 into the database of cow 1322. If this is done, then during the following milkings, when cow 1322 is identified at a milking point, *1322* flashes alternately with *7 7* before milking, and the key is deactivated. This alerts milkers that cow 1322 has received antibiotics (and her milk needs to be diverted). After the milker has arranged the milk line to divert the milk, he or she can start milking by pressing the start key *twice rapidly* + . When the cow has finished milking, the code flashes again (and reminds milkers to reconnect the milk line).

Codes 5, and 8 – *Afi-lite* Alerts

Of the eight "milking codes" (1-8), most codes can be used to determine situations as determined by the herd manager. Two codes 5 and 8, are predetermined in *AfiFarm* as alerts in specific situations.

Code 5 designates a dry cow. If a dry cow is identified at a milking point, this code is triggered.

This alert helps prevent milkers from attaching a cluster to a dry cow. This alert is automatically removed upon calving, when a calving date is entered. It can also be assigned to, or removed from a cow, at the *Afi-lite* milk meter.

Code 8 designates a colostrum cow. Code 8 is automatically assigned to a cow upon calving, when the calving date is entered.   This alert helps remind milkers to divert the colostrum. After cluster removal, flashes again, to remind milkers to reconnect the milk line. This code is automatically removed after a number of milkings (as defined by the herd manager in *AfiFarm*). It can also be assigned to, or removed from a cow, at the *Afi-lite* milk meter.

Variable Codes

The remaining "milking codes" (1 – 4, 6 and 7), can be used to designate situations as desired by the herd manager.

For example, code 3 may be used to warn milkers to milk only three quarters of the udder, and code 4 may warn milkers to use a big cluster on a cow with large udders. Code 7 is also displayed after cluster removal. Therefore this code may be appropriate for situations where milk needs to be diverted, such as with cows under antibiotics.

In *AfiFarm*, define the properties of each variable code that you use.
Click Insert ➤ Code to define codes. Adding codes and defining their properties are detailed in the *AfiFarm* User Manual.

Alerts

During milking, milk yield and conductivity are monitered closely. This data is constantly compared with *expected* milk yield and conductivity (real-time). If different than expected, one of three alerts may be triggered:

Alert 9 – A flashing 9 designates a lower milk yield *and* a high conductivity. This combination usually indicates that the cow has mastitis. This alert is triggered *after* cluster removal.

Premature Cluster Removal – milk yield flashes, and LEDs flash, after cluster removal.
(Milking machine may have fallen off.)

High Conductivity – When conductivity is higher than expected:
- Milk yield flashes throughout the milking and after cluster removal, until the milk meter is reset.
- LEDs flash for 30 seconds during milking. After cluster removal, LEDs flash another 30 seconds.

(High conductivity indicates that the cow may be mastitic.)
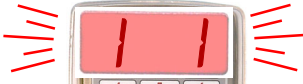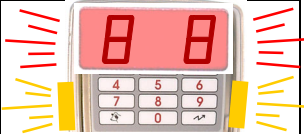
Display of Codes and Alerts

When triggered, code numbers flash alternately with the cow number or with milk yields. The table on the following page depicts how and when each code, and each alert, is displayed.

Display of Milking Codes and Alerts

Codes:

Code Number	Situation that Code Designates	Display of Code		
		Before Milking	**During Milking**	**After Cluster Removal**
		Code alternates with cow # Codes 4-8, LEDs flash.		Code alternates with yield and LEDs flash.
1	Variable - as determined by herd manager	`1  1` (flashing)		
2	Variable - as determined by herd manager	`2  2` (flashing)		
3	Variable - as determined by herd manager	`3  3` (flashing)		
4	Variable - as determined by herd manager	`4  4` (flashing)		
5	"Dry cow"	`5  5` (flashing, LEDs)	To see a code during milking, press and hold . The code alternates with the cow number.	
6	Variable - as determined by herd manager	`6  6` (flashing, LEDs)		
7	As determined by herd manager (Often used to designate an "antibiotic cow.")	`7  7` (flashing, LEDs)		`7  7` (flashing, LEDs)
8	"Colostrum cow"	`8  8` (flashing, LEDs)		`8  8` (flashing, LEDs)

Alerts

	Before Milking	During Milking	After Cluster Removal
Mastitis alert			`9  9` (flashing, LEDs)
Premature cluster removal (Milk yield flashes after cluster removal.)			`2.18` (flashing, LEDs) (Flashing milk yield)
Conductivity higher than expected (Milk field flashes until milk meter is reset. LEDs flash for 30 seconds during milking and again after cluster removal.)		`5.23` (flashing, LEDs)	`8.37` (flashing, LEDs) (Flashing milk yield, LEDs flash 30 seconds)
If the milk yield flashes after removal, check *expected* milk yield (press [↗] and [**5**]) as well as expected conductivity ([↗] and [**1**]) to identify the problem.			

this page updated June 19, 2003

Messages

Messages can be sent from an *Af-lite* milk meter to the computer. A message can be sent to the computer database, to make a notation on a cow, and is seen at the computer, when reviewing reports. One message per cow can be sent, per milking.

A message is first entered into the milk meter. Then, when the exit gate is opened, the message is loaded into the computer, together with milk data of the cow.

For example: A milker may note that cow 1299 is limping. He or she may want to inform the herd manager, who will shortly be looking at reports in the computer. The number "34" may be designated as a message that signifies a limping cow. To do this, at the milk meter where cow 1299 is identified, the milker enters the message "34". When the exit gate is opened, the message is loaded into the computer. When the herd manager reviews the Milking reports, he or she will see message "34" assigned to cow 1299 and be alerted to the cows condition.

Numbers from 01 to 99 are used to send messages. Some of these numbers are predetermined, and they are used to assign a code, cancel a code, or to send a letter.

Predetermined Messages

As detailed in the table below, certain messages (specific numbers), are predetermined for specific purposes:
- Messages 01-08 assign codes 1 – 8.
- Messages 11, 22, 33, 44, 55, 66, 77, and 88 cancel codes.
- Messages consisting of numbers in the 90's send letters to the database of the cow in the computer.

Predetermined Message	01	02	03	04	05	06	07	08		
Code Assigned	1	2	3	4	5	6	7	8		

Predetermined Message	11	22	33	44	55	66	77	88		
Code Cancelled	1	2	3	4	5	6	7	8		

Predetermined Message	90	91	92	93	94	95	96	97	98	99
Letter Assigned	A	B	C	D	E	F	G	H	I	J

Variable Messages

Any two-digit number, that is not a predetermined number, is free to be used as any notation desired by the herd manager. The herd manager can designate a free number to mean a certain message, as explained in the example above.

Milkers should know the numbers and meanings of predetermined messages as well as messages that the herd manager has designated.

Sending a Message

To send a message to the computer:

1. Type two 0's and the two digit number of the message you want to send.

2. Press [⤤] to enter the message. When the exit gate is opened, the message will be sent to the computer.

Example A: To send a message to the computer that cow 1299 is limping
(if the number 34 is designated as the message for "limping cow"):

At the milk meter where cow 1299 is identified, press:

| 0 | 0 | 3 | 4 | and then press | ↗ |.

The message is entered into the milk meter.   When the exit gate is opened, the message is loaded into the computer and assigned to cow 1299. After the message is entered, the milk meter display returns to its previous reading.

Example B: A message can be sent to *assign a code* to a cow. As in the example on page 9, to assign cow 1322 code 7:

At the milk meter where cow 1322 is identified, press:

| 0 | 0 | 0 | 7 | and then press | ↗ |.

The message is entered into the milk meter and ready to be loaded into the computer when the exit gate is opened. When the exit gate is opened, the message will be sent and code 7 will be assigned to cow 1322. The milk meter display returns to its previous reading after the message is entered.

Example C: A message can be sent to delete (cancel) a code from a cow. For example, to cancel code 2 from cow 1405:

At the milk meter where 1405is identified, press:

| 0 | 0 | 2 | 2 | and then press | ↗ |.

The message is entered and ready to be sent. When sent, code 2 will be deleted from cow 1405.

Example D: To send a message consisting of the letter D to the database of cow 1460:

At the milk meter where cow 1460 is identified, press:

| 0 | 0 | 9 | 3 | and then press | ↗ |.

The message is entered and ready to be sent (loaded in) to the computer. When sent (when the exit gate is opened), the letter D is assigned to the database of cow 1405.

Viewing a Message that has been Entered into the Milk Meter

To view a message that is entered and "waiting" to loaded into the computer (the exit gate has not yet been opened):

Press | 0 | and | ↗ | simultaneously.

Cancelling a Message

To cancel a message (if the exit gate has not yet been opened):

Press | 0 | 0 | 0 | 0 | and then press | ↗ | to cancel a message that was entered and "waiting" to be loaded into the computer.

Chapter 3: Setting *Afi-lite* Parameters

Parameters are variables that must be given a value, for the execution of a program. Some parameters in the *Afi-lite* software control cluster removal functions. Another parameter defines the milk meter identification number of each milk meter. This chapter describes how to set cluster removal and milk meter ID parameters.

Milk Meter Identification Parameter

Each milk meter must be assigned an identification number. ID numbers are assigned during installation. Normally the user does not need to assign an ID number. In the following two situations, however, an ID number must be assigned:

- When replacing milk meters, the new meter needs an ID number.

- If there has been a *complete* reload of default parameter values. (A partial reload preserves the original ID number.)

The identification number of each milk meter is displayed on its control panel with four digits. It begins with the letters *Id*, followed by two numbers. For example, *Id05* is the identification number for milk meter number five.

For a herringbone parlor, milk meters should be numbered in the same pattern as illustrated. Check ID numbers of adjacent meters to ensure that you enter the correct ID number. The default milk meter identification number is 66. Enter the milk meter identification number as follows:
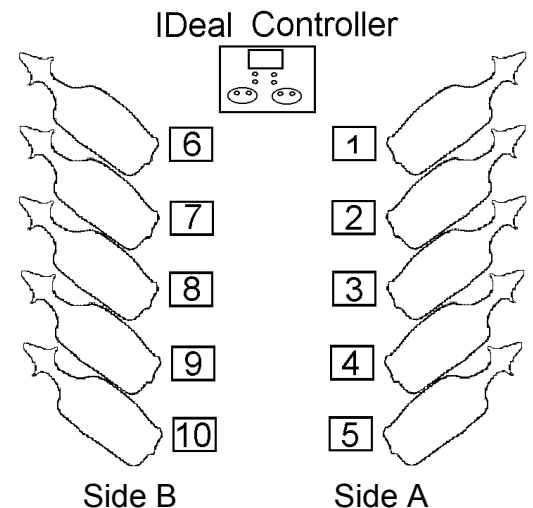
IDeal Controller

6	1
7	2
8	3
9	4
10	5

Side B   Side A

---

1. Enter programming mode:
Press ⟨🐄⟩, ⟨**0**⟩ and ⟨↝⟩ simultaneously. *18.0.0.* and *8.8.8.8.* alternate on the display.

2. Press ⟨↝⟩ & ⟨**0**⟩ simultaneously. *5.t.u.P.* appears for a few seconds. Then *I.d.6.6.* appears.	**3.** When *I.d.6.6.* appears, type the identification number of the milk meter (example: 5).	**4.** Press ⟨🐄⟩ & ⟨↝⟩ simultaneously to enter the new identification number, or press 🔘 to abort the change and exit programming mode.

The new *Id* number is entered.

NOTE:	At all times, the milking station identification number can be displayed by pressing ⟨🐄⟩ and ⟨**0**⟩ simultaneously.

Automatic Cluster Removal (ACR) Parameters

The *Afi-lite* milk meter detects when the milk flow rate from the cow has slowed enough to stop milking, then it removes the cluster.

ACR Parameters

Four parameters are involved in determining when the cluster is removed F1, F2, F3 and Ct.

F1 determines the minimum amount of time the cluster is attached. This parameter is also referred to as the "first delay". The value of F1 is multiplied by 10. The resulting value is the minimum number of seconds the cluster is attached. If the value is 18, then 180 seconds (three minutes) is the minimum attachment time. If you want to reduce the minimum attachment time to two and a half minutes (150 seconds), change the value to 15.

Parameter F1 helps prevent premature cluster removals from cows with a slower milk let-down.

F2 determines the milk flow rate at which milking will stop. When the flow rate of milk from the cow decreases, the milk meter body is emptied at greater intervals. When the milk meter body is not emptied within the time specified in F2, the cluster is removed.
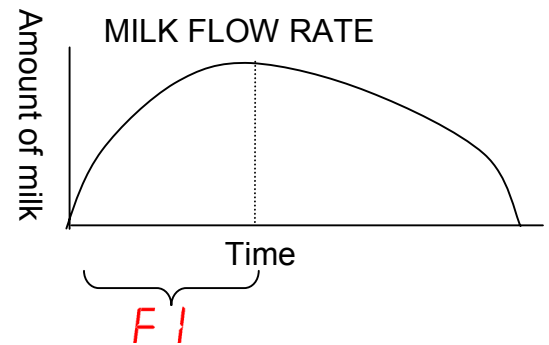
Milk flow rate is calculated as follows:

(Near the end of milking, 200 – 220 grams (0.2 kg = 0.44 lb [6.5 oz.]) of milk are released each time the milk valve is opened. [The amount is measured.] 210 grams (6.7 oz) is used in the calculations below.)

In this example, F2 = 30 seconds.

$$\text{Milk Flow Rate} = \frac{60 \text{ seconds}}{\text{value of } F2 \text{ (30 seconds)}} \times 0.21 \text{ kilograms (6.7 oz.) per minute}$$

$$\text{Milk Flow Rate} = \frac{60 \text{ seconds}}{30 \text{ seconds}} \times 0.21 \text{ kilograms (6.7 oz.) per minute}$$

$$\text{Milk Flow Rate} = 0.42 \text{ kilograms (13.2 oz.) per minute}$$

Therefore, if F2 has a value of 30, milking is stopped when the milk flow rate drops to 0.42 kilograms (13.2 oz.) per minute.

F3 controls the delay between the vacuum shut-off and cluster removal (usually one second).

Ct is the maximum cluster-on time, in units of ½ minutes. (For example, a Ct value of 14 is a maximum cluster-on time of 7 minutes. The time value of Ct must be greater than the time value of F1.)
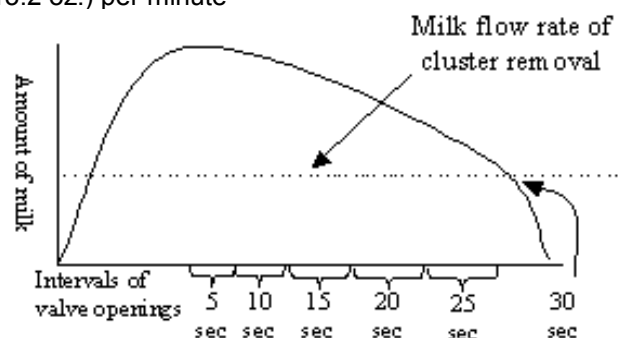
Changing Values of Cluster Removal Parameters

To change the values of cluster removal time spans, proceed as follows for each parameter, at each milk meter:

1. Enter programming mode:
Press [🏃], [0] and [↗] simultaneously. *1800* and *8888* alternate on the display.

2. Navigate to respective *"family"* of parameters.	**3.** Navigate to desired *parameter*.	**4.** Type the new value of the parameter.	**5.** Enter the value & exit programming mode.
To reach parameters *F1*, *F2*, and *Ct*, press [↗] & [6] simultaneously. *Stop.* appears for a few seconds. Then *F.1 18.* (1st parameter in the "family") appears.	While *Stop.* appears, press respective short-cut key: * For *F2*, press short-cut [2]. For *Ct*, press short-cut [3]. For *F1*, wait a few seconds until *Stop.* is replaced by *F.1 18.* .	Examples: *F2*, eg. – 30 (sec.) *Ct*, eg. – 14 (½ min.) *F1*, eg. – 15 (x 10 sec.)	Press [🏃] & [↗] simultaneously to enter the new value, or press 🟢 to abort the change and exit programming mode.
To reach parameters *F3*, press [↗] & [3] simultaneously. *APP.* appears for a few seconds. Then *C.H.02.* (1st parameter in "family") appears.	While *APP.* appears, press short-cut [7]. *	*F3*, eg. – 2 (sec.)	
* The desired parameter can also be reached by waiting for the 1st parameter to appear. Then press [↗] to scroll down, or press [🏃] to scroll up to the desired parameter.			

Chapter 3: Cleaning Routine

This chapter describes general cleaning guidelines, warnings, and recommendations.

Warnings:

- Always comply strictly with the instructions of the chemical manufacturers! Failure to comply with the instructions can cause injury and damage to equipment.

- Use gloves and protective goggles when working with chemical detergents.

- Prevent any contact with active detergents and acids in the same container.

- Avoid all contact of pesticide materials with the exterior of *AfiFlo* milk meter bodies and control panels.

- Clean the exterior of the milk meter body with hot water, *without* detergent.

Recommendations:

- Chemical dispensing pumps are recommended for accurate detergent dispensation.
- Butyl Glycol or Butyl Cellusolve in excess of 10% detergent may damage plastic components of the system. S.A.E. reccommends cleaning fluids with a maximum of 10% Butyl Glycol or Butyl Cellusolve.

General Instructions

The cleaning cycle of the *AfiFlo* milk meter body is executed in the same manner as any standard milking system cleaning cycle.

The following conditions must be fulfilled in every cleaning cycle.

- The vacuum pump operates throughout the cleaning cycle.
  A temporary halt in vacuum while the sink is being filled can cause milk and cleaning fluid to penetrate outwardly into the grooves of the gaskets.
- The milk meters are in cleaning mode.

  Press on each meter, or turn off the power to the milk meters for 30 seconds and turn the power on again, to put the meters in cleaning mode.
- The clusters are connected to the jetters.

During every stage of cleaning, check that there is sufficient water to "flood" the interior chamber of the milk meter bodies.
The volume of each milk meter body is 500cc. The amount of water required per milking point varies between 6 – 8 liters, according to:

- Parlor configuration,
- Length and diameter of milk lines,
- Volume of the receiving vessels.

If:

- A double size milk line is installed in the parlor,
- Or the milk tank is far from the parlor,
- Or both of the above,

Then calculate additional water for cleaning.

Hint	Parlor cleaning preparations can begin while still milking. When the last batch of cows is on a side of the parlor, milkings clusters can be placed on jetters as cows finish milking: 1. After a cluster has been removed from a cow, and the removal process is finished, press to lower the cluster. 2. Insert the milking cups onto the jetters.

Cleaning Cycle

There are various cleaning systems and procedures in use in milking parlors. Nevertheless, the following rules must be followed for all the procedures and detergents in use.

Detergent Wash

1. Initial cleaning in an open circuit, to rinse out residual milk: Use luke-warm water that is emptied in the drain, until the water becomes clear.
   The temperature of this rinsing water should be roughly body temperature:
   - If the water is too cold, milk fats will solidify onto surfaces, and will be more difficult to remove.
   - If the water is too hot, milk fats may be "baked" onto the surfaces.

2. Circulate the water in a closed circuit (CIP) with detergent.
   Use a basic detergent additive (pH=13) and hot water:
   - Entry water: 70°C [158°F], or hotter,
   - Returning water: 55°C [131°F], or hotter.
   a. Start circulating with hot water, and empty the water in the drain for a short time until the system is warmed up.
   b. Bring the milk line to a circulating position, add the soap and circulate for 10 – 12 minutes.
   c. Drain the cleaning fluid.

3. Rinsing: open circuit.
   Use cold water. Empty the water in the drain until the water becomes clear.

Warnings: Follow all of the manufacturers' recommendations, including: concentrations, temperatures, and cleaning-cycle times. Excessive use of chemicals may damage the milk meters.
Leaving the detergent inside the milk meter may damage its components.

Acid Wash

Do this acid wash once a week, or more frequently, where necessary. This acid wash is not in place of the daily cleaning routine. (There are some cleaning solutions available that remove both milk residues and hard water salts.)

1. Rinse the detergent solution out of the system with cold water.

2. Circulating with phosphoric and/or sulfuric acid.
   Use hot water and a chemical additive:
   - Entry water: 70°C [158°F], minimum,
   - Returning water: 50°C [122°F], minimum,
   Circulate the solution for 10 – 12 minutes and drain.

3. Rinse the system with cold water.

Operation in Cleaning Mode

An automatic delay schedule prevents excessive load on the power supply. During Cleaning Mode, valves are pulled up and the milk chamber is emptied. The automatic delay schedule desynchronizes the pulling up of the valves thereby preventing excessive load on the power supply.

The schedule creates a delay of 100 msec between stalls and is set according to milking point numbers. Every seventh milking point has the same delay time. In a 12 station parlor, this results in the following operation pattern:

- The valves of stalls 1 and 7 are pulled up first.

- The valves of stalls 2 and 8 are pulled up after a 100 msec delay.

- The valves of stalls 3 and 9 are pulled up after a 200 msec delay.

- Etc.

The delay is counted from the time the cleaning mode is activated. Synchronize the parlor in cleaning mode by setting all milk meters in cleaning mode and switching the power to the parlor off and on again.

Cleaning Exterior Surfaces

To clean exterior surfaces of milk meter bodies and control boxes, moisten a soft cloth with water and *gently* rub the surfaces.

| **WARNINGS:** | 1. Detergents are destructive. Do not use any kind of detergent on either the control panel or on the milk meter body. |
| | 2. Do not direct jets of water on the *Afi-lite* milk meter control box. |

Chapter 4: Milk Meter Body and Fat Sampler

This chapter contains information about:

- The basic structure and components of the *AfiFlo* milk meter body.

- Silicone and rubber component replacement.

- The fat sampler.

The Milk Meter Body, Structure and Components

Milk inlet

Electrode

Electrode

Electrode

Valve

Silicon Diaphragm

Milk Outlet

Upper Clasp

Upper Cover and
Milk Inlet

Upper Gasket

Mid Section

Lower Cover
and Milk Outlet

Lower Gasket

Bottom Clasp

Solenoid Valve
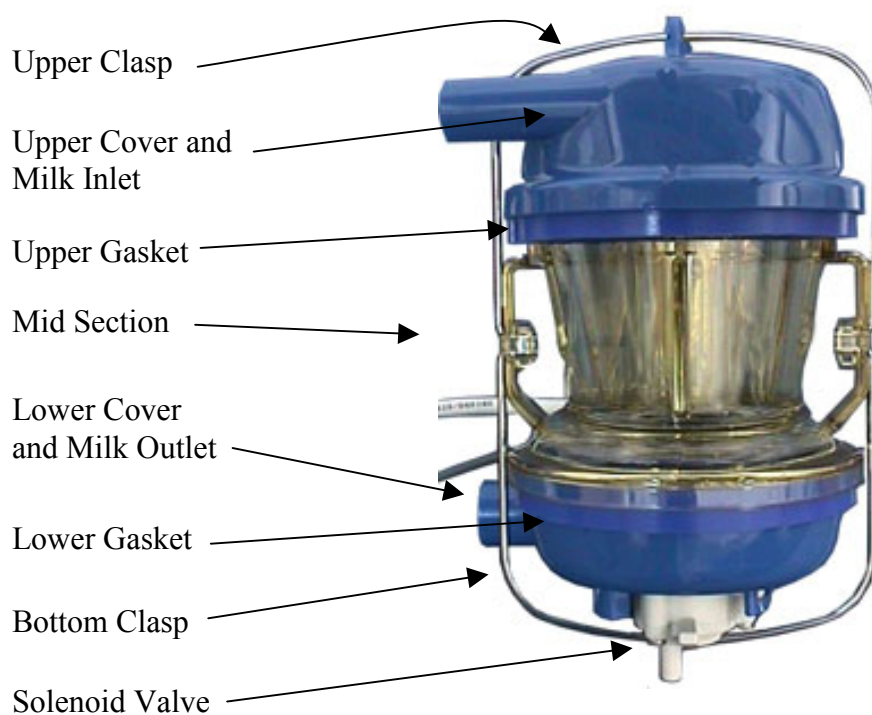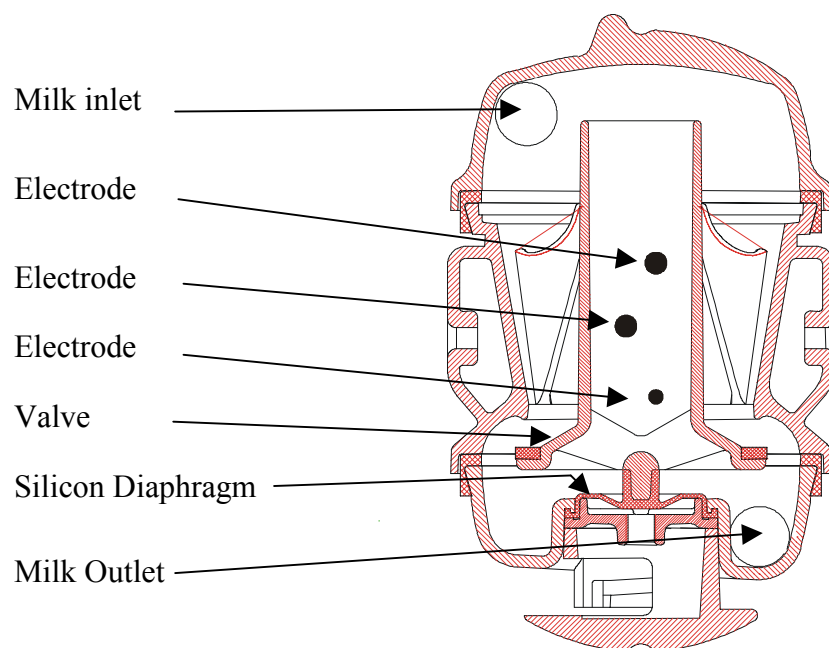
The *AfiFo* milk meter body is a plastic container made up of three main parts:

- The Upper Cover and Inlet Port:
  Milk enters the main chamber through the inlet port.

- The Main Chamber:
  Milk fills the mid section while the valve is closed (in upper position).

- The Lower Cover and Outlet Port.
  When the solenoid is energized, the valve opens and releases the milk. The milk flows through the lower part and outlet port to the milk line.

Within the *AfiFlo* milk meter body are:

- Three electrodes.

- A cylindrical valve, which is also an overflow tube.

- A silicon diaphragm.

The electrodes detect the milk level. A signal prompts the opening and draining of the central chamber. The electrodes also sense the milk's conductivity. The precise amount for measurement is not predetermined, and measured milk portions may vary from 180–250 cc.

When the solenoid valve is energized, vacuum from the solenoid line causes the silicon diaphragm to pull the valve down. This releases a portion of the milk.

Depending upon local configurations, attached to the exterior of the milk meter body may be:
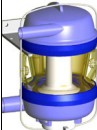
- A fat sampler attached to the milk outlet. Information about the fat sampler follows, in this chapter.

- A single vacuum shut-off valve. Upon cluster removal, this valve shuts the vacuum to the cluster.

- A triple diaphragm valve, side mounted, back-flush assembly. This assembly allows for a back-flush between the milking of cows. The back-flush is advantageous in that it decreases the likelihood of cross-contamination of cows between milkings. Upon cluster removal, one of the three valves shuts off vacuum.

Silicone and Rubber Component Replacement

Replace the following four components once a year:

- The upper and lower silicone gaskets.
  Note: Order *two* of these gaskets for each milk meter.

- The silicone valve gasket.

- The silicon diaphragm.

Partial Parts List of *Afi-lite* Plus:

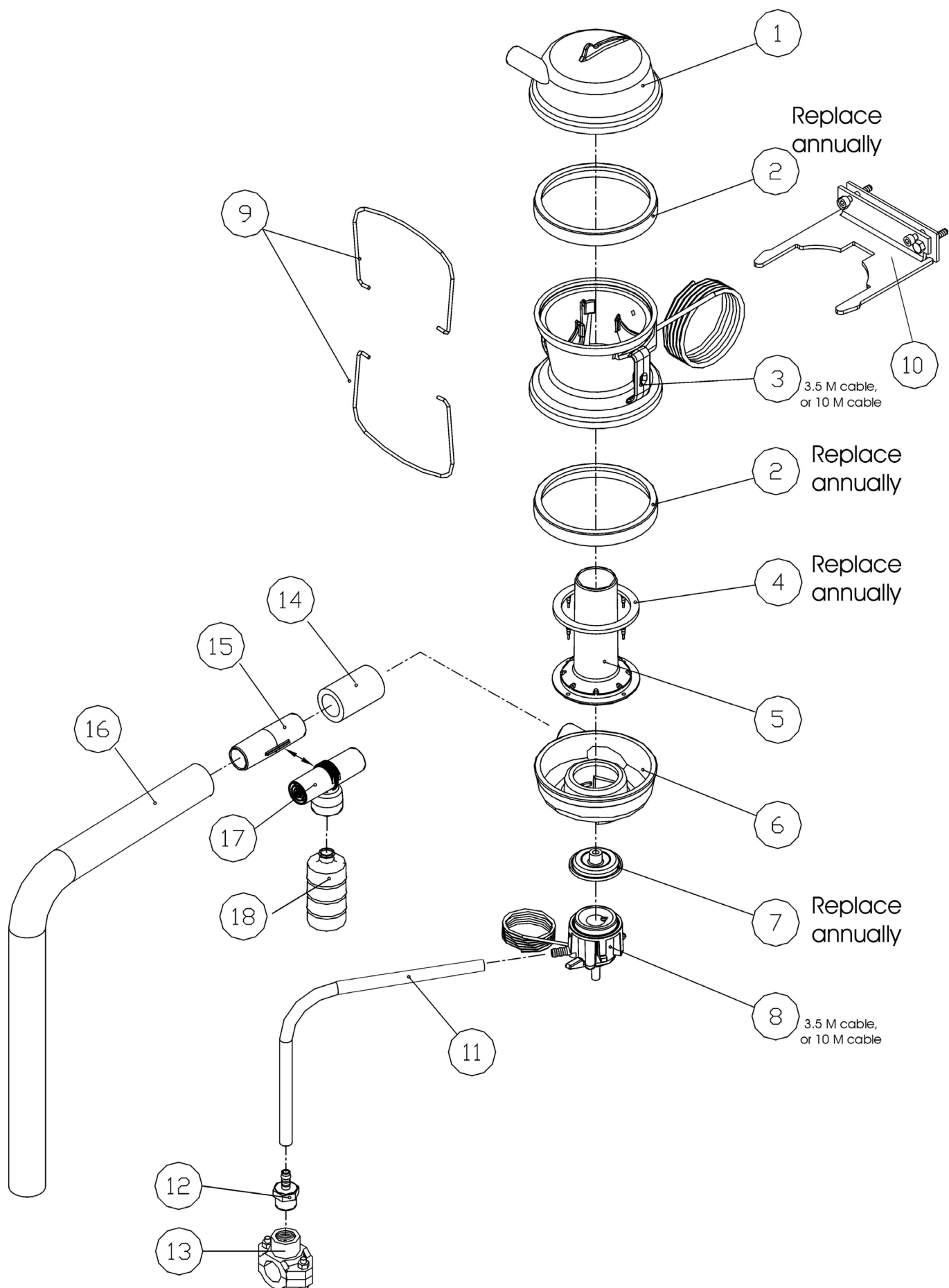| Item			Cable length option	Standard cable lengths	Longer body cables	Longer body cables, Longer *Afi-lite* cable
				Part Number		
				4098999	**4098999AC**	**4098999CC**
			***Afi-lite* control box, packaged**	**4097950**	**4097950**	**4097950c** (3.5 M cable)
			Afi-lite control box ass,y	4097900	4097900	4097900
			Cable, + D-type connector	4000400 (1.8 M cable)	4000400 (1.8 M cable)	4000400c (3.5 M cable)
			Mounting bracket + screws	5001731	5001731	5001731
			***AfiFlo* body, assembly**	**4098120**	**4098120C** (10 M cables)	**4098120C** (10 M cables)
		1	*AfiFlo* body upper cover	4098037	4098037	4098037
	Replace annually	2	*AfiFlo* body gaskets, upper & lower, silicone: x 2	4098095	4098095	4098095
		3	*AfiFlo* body midsection,	4098050 (3.5 M cable)	4098050C (10 M cable)	4098050C (10 M cable)
	Replace annually	4	*AfiFlo* body valve gasket	4098072	4098072	4098072
		5	*AfiFlo* body milk valve	4098070	4098070	4098070
		6	*AfiFlo* body lower cover	4098040	4098040	4098040
	Replace annually	7	*AfiFlo* body valve diaphragm	4098071	4098071	4098071
		8	*AfiFlo* body solenoid valve	5000178 (3.5 M cable)	5000178C (10 M cable)	5000178C (10 M cable)
		9	*AfiFlo* body retaining clasp	4098041	4098041	4098041
		10	*AfiFlo* body bracket	4098015	4098015	4098015
		11	Tube, 8mm pneumatic (Polyurethane)	5000001	5000001	5000001
		12	Connector, male, straight, 8mm x 1/2"	5000219	5000219	5000219
		13	*AfiFlo* body socket, vacuum line, 25mm x 1/2"	5000385	5000385	5000385
		14	Connector to outlet port	4098011	4098011	4098011
		15	Sampler replacement tube	4098012	4098012	4098012
		16	Elbow joint to milk line	4098086	4098086	4098086
		17	Fat sampler, assembly	4098007	4098007	4098007
			Sampler	4098099	4098099	4098099
			Sampler bottle holder	4033424	4033424	4033424
		18	Sampler bottle	4033429	4033429	4033429

1

Replace
annually

2

9

10

3 3.5 M cable,
or 10 M cable

2 Replace
annually

14

4 Replace
annually

15

5

16

6

17

7

18

Replace
annually

8 3.5 M cable,
or 10 M cable

11

12

13

The Fat Sampler

International dairy authorities, as well as most local dairy authorities, require the sampling of milk during the milking process. Mounting a fat sampler enables the dairy to comply with these regulations.

Mounting the Fat Sampler

The fat sampler is mounted between the outlet port and the elbow joint to the milk line.

> **NOTE:** During normal milking, when not sampling, a sampler replacement tube fills the gap reserved for the fat sampler.

Connector to outlet port

Sampler replacement tube

Elbow joint to milk line

Sampler

Sampler bottle holder
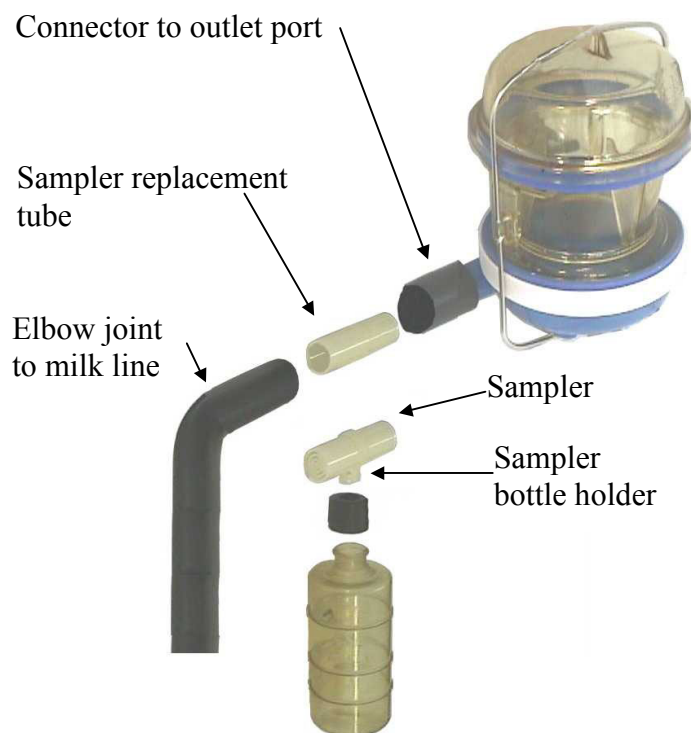
Fat Sampler Operation

The fat sampler is made up of a sampling bottle and a sampler head.

Milk is sampled each time the meter body is emptied. As the milk flows out of the milk meter body, a small quantity is diverted by the sampler head into the sampler bottle. This method assures sampling during all stages of the milking session.

Chapter 6: Troubleshooting

The *Afi-lite* milk meter is equipped with alerts to advise milkers of problematic situations. There are two kinds of alerts:

- Premature cluster removal alerts.

- Operational fault alerts (error alerts).

Premature Cluster Removal Alert

A cluster can become detached before the end of milking. Premature cluster removal is indicated by a flashing display of milk yield. If the milk yield flashes after removal, check *expected* milk yield (press [↗] and [**5**]) as well as expected conductivity ([↗] and [**1**]) to identify the problem.

To continue milking from the previous milk measurement:

1. Press [🟢].

2. Reattach the cluster.

Error Alerts

Error alerts flash in the display panel of the milk meter. They alert milkers to *Afi-lite* operational faults.

$E01$ Error Alert

$E01$ indicates an overloaded or short circuit in one of the *Afi-lite* outputs.

When an error occurs, $E01$ appears in the display panel and alternates with a notation that indicates the faulty output. The notation is made up of the word Out followed by the number of the output, where there is a malfunction.

Notations of malfunctioning outputs, and respective functions, (in the default configuration) are listed below:

Notation Displayed	Faulty Output
$Out1$	Milk valve solenoid (in milk meter body)

$Out2$	Output #2: Solenoid that controls removal device
$Out3$	Output #3: Solenoid that controls vacuum shut-off to cluster
$Out7$	Output #7: Solenoid that controls front pulsator
$Out8$	Output #8: Solenoid that controls rear pulsator

$E02$ Error Alert

This alert indicates that the milk valve has been in the open position for an abnormally long time, and may be stuck in that position.

$E03$ Error Alert

This alert indicates a communication problem. Call the dealer for service.

More Troubleshooting

Your dealer will be pleased to assist you. Contact him if you have a problem not covered below or if the solutions suggested fail to solve the problem.

Problem	Probable cause	Solution
Afi-lite control box display is not illuminated.	Power supply cable is not properly connected to the *Afi-Lite* control panel.	Check and correct.
When power is turned on, *Afi-lite* control box display is activated for a short time, and then does not function.	Short circuit. A circuit breaker inside the control box stops current when circuit is overloaded.	If the problem continues, replace the milk meter.
Display shows $E01$.	An overloaded or short circuit.	Check all connections. Call for service.
Display shows $E02$.	Plugged air bleed. Negative hose angle from milk meter body to milk line.	Check and clear air bleed. Correct hose angle to enable free flow of milk from the milk meter body to the milk line. Call for service.
Display shows $E05$.	Program error	Press ⬤. If the problem continues, call your dealer for service.

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